THE WENHAM BINOCULAR. CAN IT BE MADE ADJUSTABLE TO A VARIABLE TUBE LENGTH?

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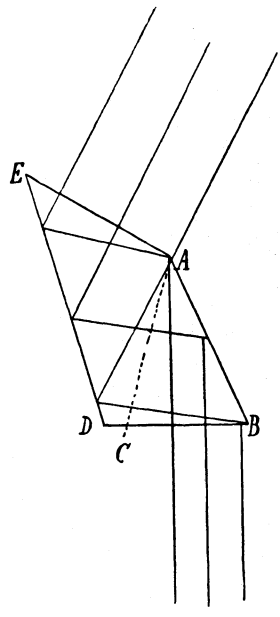
The Wenham prism is, in the nature of the case, applicable to only one particular angle between the two tubes of the microscope and that angle fixed by the maker. If it could be so constructed as to admit of easy and accurate accommodation to any tube length between the shortest of the Continental model and the longest of the American it would be a decided advantage; also, if at any particular tube length it could be adaptable to different widths of pupillary distance without change of focus, that also would be an advantage.

The difficulties in the way are twofold—optical and mechanical. The mechanical can, in my judgment, be overcome if the optical can be circumvented; and it is the object of this note to raise the question of practicability.



The well-known form is based on the principle of two reflections from nearly parallel mirrors. If the angle between these mirrors could be adjustable, that would allow the rays to be sent up through the oblique tube to the left eye at different angles to suit different tube lengths. A diagram of the course of the rays through the prism is needful in order to understand what is proposed.

Let the prism be cut through on the dotted line from angle "A" to some point near "D," the opposite obtuse angle, say at "C," so as to cross the rays proceeding from the reflecting face "A B" to reflecting face "E D," at right angles to their average course. It would now be possible

to rock the wedge "A C E" on a pivot located at or near "A," so that the rays from the reflecting surface "E D" would be sent at the desired angle to the left eye.

The question to be answered is, would the small amount of movement needed be such as to seriously alter the course of the rays passing from one reflecting surface to the other across the air-space? Would there be perceptible refraction or dispersion of color? If not, I think we might well ignore the small loss of light which would occur at the two new surfaces introduced.

Next, as to the mechanical difficulties:

First, the movement of the left tube should automatically rock the prism the required amount. I think the left-hand tube might be pivoted to the main straight tube at or near the location of angle "A," the upper end of its exterior tube being guided by an arm fastened to the front of the main tube, which should consist of an arc struck from the same "A" as its center, the tube being clamped by a set-screw to this arc when adjusted.

A very simple arrangement of levers would cause the half prism to rock on this same pivot half the number of degrees which the oblique tube had been moved through. The half "A B C" of the prism which receives the rays from the objective should be so mounted in its separate frame as to be thrown up to the interior of the tube on the side opposite the second half, which would be permanently out of the way of the full cone of rays when using the instrument as a monocular.

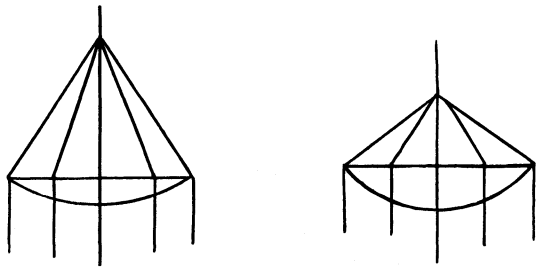
Some difficulties of a mechanical sort would have to be overcome in so fitting the movable side tube as to exclude light in all its positions, but nothing serious would stand in the way. Each tube would be fitted with its drawtubes, by means of which the binocular arrangement could be applied through quite a range of tube length.

A second and entirely distinct query has been in my mind as to the construction of *paired* oculars for binocular use. If I understand aright, the optician now makes the left-eye ocular slightly shallower than the right in order to compensate for the extra length which the rays have had to take going through the prism.

In a couple of pairs which I have, there has thereby been introduced a new difficulty.

The cone of rays entering the pupil of the right eye come through an eye lens of certain curvature and are concentrated a certain fixed distance above, at which exact point the pupil of that eye must be placed to command a view of the *whole* field. Now, the left eye,

with its shallower eye lens, finds it necessary for its comfortable view of its whole field to be a little further off, and no position can be found but what is one of discomfort and failure to command one or other of the two fields.



Are there any serious difficulties in the way of throwing this work of equalizing the two images onto the *field-glass entirely*? Then the two eye lenses could be made just alike and the trouble I have met with be overcome.